



Railway Scheduling and Re-Dispatch Optimization

AI Agents orchestrating + 40,000 train rides per day across Germany.

Industry Context:

Europe's railways are the backbone of sustainable mobility and logistics. But growing passenger and freight demand, aging infrastructure, and limited network capacity are putting planning systems under immense strain.

With over 40,000 train rides daily across 33,000 km of tracks, Deutsche Bahn faces one of the most complex operational challenges in Europe, balancing efficiency, punctuality, and infrastructure growth.

The Challenge: When Complexity Becomes Unmanageable

Manual and static scheduling tools can no longer sustain the scale, interdependence, and dynamism of today's increasingly complex railway ecosystem.

- In 2023, 46% of DB's long-distance trains ran late.
- Infrastructure CAPEX reached €12.7B (+19% YoY), yet capacity bottlenecks persist.
- Future projects show passenger demand doubling and freight tripling by 2050.
- Traditional planning is reactive: unable to anticipate disruptions or optimize long-term development coherently.

Our edge: AI Agents for Rail Network Optimization

In collaboration with Deutsche Bahn, InstaDeep is developing a suite of AI-powered scheduling and dispatching agents capable of autonomously constructing, optimizing, and re-dispatching train schedules across time horizons, from daily operations to long-term infrastructure planning.

Using Deep Reinforcement Learning and a high-fidelity simulation model of the German railway network, these agents continuously learn to:

- Optimize timetable design and resource allocation
- React to disruptions in under 1 min by recomputing optimal routes, speeds, and platforms.
- Evaluate infrastructure development strategies with measurable impact predictions.

This transforms railway planning from static scheduling into continuous, adaptive optimization.

Potential value:

- **Service Quality:** Up to 40% delay reduction through autonomous re-scheduling.
- **Network efficiency:** 7.5% capacity increase without additional infrastructure.
- **Automation:** 90% OPEX reduction by automating dispatcher workflows.
- **Financial impact:** Over €1B in expected manual savings through optimized planning and utilization.

Get in Touch:

Let's talk about bringing autonomous AI optimization to your operations.

hello@instadeep.com